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NOTE.

This Memoir represents substantially the amplification of certain experimental researches, which were summarized in a paper published in the "Medical Record" of February 18th, 1882.

The kindly interest unremittingly displayed by a large number of gentlemen who are advancing the cause of scientific medicine, has led me to hope that this brief essay may find a charitable reception. The vast and unexplored nature of the problem is apparent, and this fact may be urged as a reason for the present publication.

No. 365 Lexington Avenue,
New York,
March 29th, 1882.

DIGITAL
COMPRESSION OF THE CAROTIDS.

HISTORICAL.

THERE exists but little doubt that the more ancient writers on medicine were familiar with the fact that digital compression of the carotids may produce a state of unconsciousness analogous to physiological sleep. Dr. Pilz* refers to the knowledge which Rufus of Ephesus (Morgagni, de sedibus et caus. Morb. epist. 19), possessed on this subject. The following quotation from the latter is derived from Dr. Pilz's admirable paper: "Arterias per collum subentes carotides, id est somniferas, antiquos nominesse, quoniam compressæ hominem sopore gravabant."

Around all these early attempts at compres-

* "Zur Ligatur der Arteria Carotis communis," von Dr. C. Pilz, contained in Langenbeck's "Archives for Clinical Surgery," vol. ix., p. 406. 1868.

sion, however, there hangs a veil of uncertainty, which is but in ill accord with the logical exigencies of modern medical science. For a very considerable period of time, the procedure was entirely forgotten. In 1792, however, the attention of the profession was again directed to the subject by Parry, of Bath, who resolutely defended digital compression as a most useful measure for the alleviation of convulsive disorders.

In 1819 Dr. M. Bland published some interesting cases, illustrative of the efficacy of digital compression of the carotids in brain-disorders characterized by cerebral engorgement.

An interesting paper, by J. B. Stroehlin,* entitled, "*De la compression de la carotide, employé comme moyen thérapeutique dans les maladies convulsives*," contains many points of value: After presenting several cases treated by digital compression of the carotids, the author of this article proceeds to state that he shares the opinion of Dr. Trousseau, that the device of digital compression of the carotids is useful in

* Contained in the *Journal Medico-Chirurgical* of November, 1840.

cases of "congestive convulsions," in which a "fluctuation" of blood toward the brain is recognizable as a causative factor. This author furthermore states in the same article, that he had frequently heard Dr. Trousseau remark, that if he or his children should become afflicted with epilepsy, he (Trousseau) would have no hesitation in demanding the ligation of the carotid on the side opposite to that on which the convulsions appeared.

In a brief, but most suggestive article, published in the *Medical Examiner* of April, 1841, Dr. Trudeau calls attention to the great efficacy of digital compression of the carotids in convulsive disorders. The author also cites a case of "acute meningitis," in which he essayed digital compression of the carotid arteries with good results. Dr. Trudeau refers in the same paper to the discussion respecting the priority of discovery of digital compression, which ensued on the publication of MM. Trousseau's, Badelocque's, and Malapert's papers. Reference is also made to the published criticism of Dr. Dezeimeris, which also appeared in connection with the discussion of priority. By this arbiter the

honor of the discovery of the therapeutic efficacy of digital compression of the carotids is awarded to Parry, of Bath. In concluding his interesting paper, Dr. Trudeau says: "From my own experience, I do not hesitate to say that it (carotid compression) ought to take its place among the most powerful means which we possess of combating these (convulsive) diseases. The subject is but little known; a vast field is open!"

In 1848 Waller* published an essay on the uses of digital compression, in which he speaks favorably of its employment in headache, epilepsy, hysteria, etc. He also cites cases in which he has had recourse to this form of treatment, and speaks well of its results. This author speaks of the difficulty often experienced in the application of *digital* compression to the carotids during very violent epileptic attacks, owing to the excessive convulsions of the cervical muscles. It was this fact, also observed by myself, which induced me to construct a

* "On Compression of the Carotids—Its effects on Headache, Epilepsy, Hysteria, etc." By Augustus Waller, M.D. *Journal of Psychological Med.* London, 1848.

special instrument for the performance of temporary instrumental compression of the carotids. I shall have occasion to refer to this instrument hereafter.

T. W. McArthur,* in a paper published in 1855, expresses his conviction that compression of the carotids is beneficial "in at least some convulsive diseases."

"De la Ligature et de la Compression des Artères Carotides," is the title of a comprehensive article by Dr. Guibert,† published in 1865. The author gives expression to his views, touching the merits of digital compression as a therapeutic agent, and notes with regret the fact that a procedure of such manifest value should have been so long ignored by the profession. The effects of ligation of the carotids, more especially as exhibited in animals, are referred to by this author at considerable length.

For comprehensive and felicitous elucidation of the various questions involved in the consideration of sleep, Dr. Hammond's classical work on "Sleep and its Derangements" certainly

* *Medical Counsellor* for September, 1855.

† Appeared in the *Union Medicale* of January, 1865.

belongs in the front rank of scientific research. More particularly to be commended are Dr. Hammond's profound experimental researches on the condition of the brain during sleep and wakefulness.

DIGITAL COMPRESSION OF THE CAROTIDS IN EPILEPSY.

About one year ago, considerations of an anatomical and physiological character induced me to begin a series of experimental investigations, with the object of elucidating certain phenomena, observable in epileptics, which point to a deranged condition of the cerebral circulation.

The extraordinary venous hyperæmia, as well as the violent pulsations of the carotids, which these patients exhibit during the attacks, awakened in me the suspicion that there is some co-sequence between the sanguineous engorgement and the persistent continuance of the "attack."

It did not occur to me, however, to perceive in this engorgement the *inceptive* motive of the attack; indeed the striking pallor which epileptics exhibit immediately prior to the seizure,

would appear to afford sufficient proof that the attack is primarily owing to the irritative influences of excessive anæmia. But admitting all this to be true, it would nevertheless seem necessary, after the cessation of the anæmia, to look elsewhere for those causes most intimately concerned in the further continuance of the seizure. As above intimated, the most striking phenomena which present themselves, after subsidence of the first condition of anæmia, are the excessive venous hyperæmia and the throbbing of the carotids. I therefore determined, before perceiving in more occult forces a reason for the continuance of the attack, to allay artificially the condition of cerebral engorgement and to await the result. With this end in view, I compressed digitally both common carotid arteries of an epileptic who had just entered upon a series of violent paroxysms; the usual duration of the status epilepticus, in this case, being from thirty to forty-five minutes. In about five minutes, the convulsions were completely checked, and the patient remained in a perfect state of consciousness. The rapidity with which fulness developed in the radial pulse on compression

of the carotids was most striking. Noteworthy also was the concomitant return of consciousness and cessation of convulsions with the increase in strength of the radial pulse. At this time I was totally unaware of the achievements of Parry, in 1792, with digital compression, and my experiments were undertaken as the result of deductive reasoning from purely anatomical and physiological premises.

No. I.

AUTHOR'S INSTRUMENT FOR TEMPORARY COMPRESSION OF THE CAROTIDS.

INSTRUMENTAL COMPRESSION OF THE CAROTIDS.

TEMPORARY INSTRUMENTAL COMPRESSION OF THE CAROTIDS.

AFTER having essayed digital compression on several subsequent occasions, and having repeatedly convinced myself of its efficacy as a means of aborting epileptic attacks, I became unhappily aware that in certain very violent paroxysms it is impossible to exert the necessary pressure upon the arteries with the fingers, owing to the excessive spasm of the cervical muscles. I must confess that for some time I was in considerable doubt as to how this obstacle was to be overcome; but finally, as good fortune would have it, I hit upon the expedient of constructing an instrument which enables the operator to exert his strength to the best possible advantage (*vid.* plate No. 1), while admitting of a far more accurate adjustment than can possi-

bly be obtained by the use of simple digital compression. The chief features of this instrument are two curved metallic armatures, to each of whose extremities is attached a pad, which by means of a screw, provided with a detachable key, can be placed at any desired angle. The object of this latter device is to permit of so arranging the pads that the artery is compressed *away* from the jugular vein, and in the direction of the spinal column. The other extremities of the curved armatures are attached to a handle by means of an Archimedian screw, which transfixes the latter in its entire length. By rotating the button which is attached to the disengaged end of the screw, the curved armatures can be extended or approximated at will.

MODE OF EXECUTING TEMPORARY INSTRUMENTAL COMPRESSION.

Digital compression of the carotids has been found of the greatest utility in a very large variety of convulsions. It has been essayed during the convulsions peculiar to epilepsy, hysteria, and acute meningitis, but I am not aware that its effects on the spasmodic condi-

tions peculiar to hydrophobia have ever been ascertained. My own experience with compression is confined more particularly to epilepsy, maniacal excitement, and congestive headache. Those authors, however, who have resorted to it in various other convulsive disorders, speak of its efficacy in the highest terms; and certainly, statistics on this subject would be most valuable.

The method of employing the instrument, devised for temporary compression, is quite simple, and I have found it vastly superior to the primitive procedure of digital compression. Having placed the patient upon a bed, in a horizontal and semi-dorsal position, the head and shoulders being supported with properly adjusted cushions, the operator takes his position by the bedside, in such a manner that his left side is turned toward the bed, and his view directed toward the face of the person requiring assistance. Then, having with the index finger of the right hand ascertained, by careful exploration, the exact position of the arteries, the operator proceeds, accurately adjusting the armatures of the instrument, in such wise that the pads, which have previously been turned

somewhat inward, and fixed by means of the key, will, when brought into position over the arteries, press the latter *away* from the pneumogastric nerve and jugular vein in the direction of the spinal column.

In exerting compression, the instrument should be held in the right hand, the handle of the same forming a perpendicular to the arteries. With the left hand pressed firmly against the superior portion of the neck, the operator exerts the necessary counter-pressure, and at the same time contributes to the support of the head in the desired position. To be effectual, such pressure must be considerable—very much more so than in prolonged compression. Compression should, however, never be carried to such an extent as to cause entire closure of the lumina of both arteries; such a procedure may cause convulsions, should the anastomotic facilities in the Circle of Willis be inadequate to meet the unwonted physiological exigencies. This contingency, however, is not liable to occur, as the degree of pulsation in the temporal arteries affords reliable information as to the extent of the circulatory obstruction.

Very severe instrumental compression should not usually, I believe, be continued for more than ten or twelve minutes.

That portion of the continuity of the common carotid artery, which I have found best suited to the application of instrumental compression, is situated opposite a point which is located slightly above the juncture of the thyroid with the cricoid cartilage. Although much can be obtained by instruments, the final success attending their use will depend greatly on the dexterity of the operator himself.

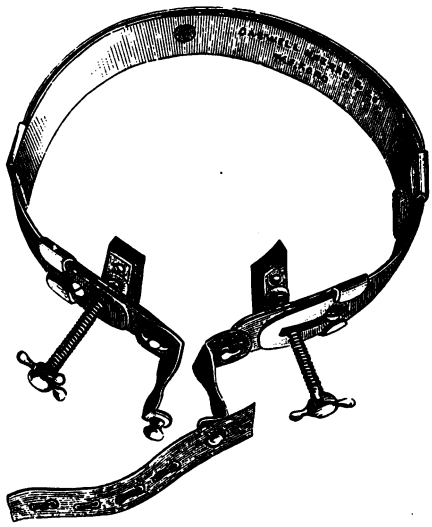
PROLONGED INSTRUMENTAL COMPRESSION OF THE CAROTIDS.

Having repeatedly convinced myself that it is usually possible to arrest the paroxysms, peculiar to epilepsy, by means of temporary compression of the carotids, I began to soliloquize as to the nature of epilepsy itself. On referring to histories of numerous autopsies, I was bewildered by a mass of pathological findings, distributed throughout the various organs, no particular group of which could I by any logical necromancy identify as pre-eminently charac-

teristic of the disorder in question. There was one species of lesion, however, of tolerably frequent occurrence, namely, an affection of the cortex, usually involving, to a greater or less degree, the integrity of the adjacent membranes. When I considered the prominent part which the branches of the internal carotid play in the blood-supply of the hemispheres, I could not help asking myself the question: Is there not some connection between these lesions and the extraordinary anomalies in the cerebral circulation, which prevail during the attack? And granting this to be a logical supposition, is not, I asked myself, the fact that the convulsions cease on diminishing the amount of blood in the carotid circulation, sufficient to arouse strong suspicions that the tonic and clonic spasms are caused by cortical discharge due to the irritative effects of the engorged cerebral vessels?

As a matter of course, this argument presupposes the direct or indirect primary invalidity of the vaso-motor mechanism. It was a natural thought that perhaps the effects of this central decrepitude might possibly be indemni-

No. II.



AUTHOR'S CAROTID TRUSS.

fied by resort to some means of artificial limitation, applied to the trunks of those great arteries most intimately concerned in the cortical blood supply. These and kindred reflections induced me to essay *prolonged* compression, soon after having noted the possibility of checking an epileptic seizure by pressure upon the carotids. To this end, I made experiments with various mechanical devices, which I designed for the purpose of protracted compression of the carotids. Some of these appliances were formidable and complicated, but as inefficient as they were formidable. It was only after repeated and discouraging trials, that I finally succeeded in devising a species of truss, which, while being simple and inexpensive in construction, seems to fulfill both the theoretic and practical demands of the problem in every respect (*vid.* plate No. 2). This carotid truss consists of two semicircular springs, one of which is provided with a longitudinal slot. Through this slot passes a screw, that is securely imbedded in the periphery of the second spring which lies directly below and in perfect apposition with the first. By sliding one over the other,

the radius formed by the two springs may be increased or diminished at will; while by tightening a nut, with which the screw is provided, they may be held in any desired position. To each of the free extremities of the springs is attached, by means of a ball and socket-joint, a delicate pad. The ball of this joint is attached to a screw which can be lengthened or shortened at will. The pads can be moved to and fro by means of a short longitudinal slot, and secured in position with a screw.

MANNER OF APPLYING PROLONGED COMPRESSION.

The mode of applying this instrument is as follows: Having first, by means of the radial screw, which provides a *coarse* adjustment, adapted the radius of the truss to the circumference of the neck of the patient whose arteries are to be compressed, the operator next proceeds to adapt the pads to the arteries, by means of the smaller anterior slots and screws, which afford a *fine* adjustment. The region of the artery to be selected for permanent compression is precisely the same as that to be

chosen in temporary compression. The pads should be so arranged, namely, that their superior margin is situated about opposite the juncture of the thyroid with the cricoid cartilage. Connection may be established between the extremities of the truss by means of an elastic band, secured at each extremity by detachable clamps. This elastic band is provided with a buckle. By lengthening or shortening the band, pressure can be increased or decreased at will. Protracted pressure should never be so great as to cause serious inconvenience or giddiness. On the other hand it must be sufficient to sensibly diminish the lumen of the artery, otherwise no good will be likely to result from the procedure. More difficulty is experienced in the adjustment of instruments to the necks of fleshy persons than to those of less full habit. Prolonged compression is furthermore not usually so well borne by these fleshy patients, as in order to act upon the lumen of the artery through the superincumbent adipose tissue, considerable pressure must be employed, and this they find it hard to reconcile themselves to for very considerable periods of

time. In most cases, however, with the employment of proper dexterity and tact, patients are very glad to wear apparatus of this kind for very long periods of time. This is all the more readily accomplished when they become aware that a high loose collar effectually conceals the truss from the gaze of the inquisitive. With this and similar instruments I have compressed for more or less protracted periods the carotid arteries of a number of epileptics. Although some of these patients were subject to as many as three or four attacks every twenty-four hours at the time I began treatment by protracted compression, I was enabled to arrest the convulsions entirely for the space of many days—indeed in some instances for several weeks. Nor did these good effects disappear directly on cessation of compression; on the contrary, the attacks were less frequent for a considerable time after removal of the instrument. Remarkable was the effect of compression on the peripheral circulation. In some of the cases in which I essayed compression, the disordered state of the vaso-motor mechanism [redacted]ently displayed in the cold and

cyanotic condition of the extremities. After applying compression for a certain length of time in these cases, the venous stasis was replaced by a healthy glow, and the condition of frigidity was replaced by one of actual warmth. These facts are certainly significant, for I can only attribute the above effects to the direct or indirect beneficial influence of compression on the vaso-motor centres.

Certainly the amount of blood excluded from the brain by compression, and consequently directed to other corporeal regions, would of itself hardly account for the peripheral effects. We must rather, I believe, ascribe these beneficial results to the benignant action of compression on the cerebral centres themselves.

COMPRESSION AS A SOMNIFEROUS AGENT IN MANIACAL EXCITEMENT.

Having noted the efficacy of compression in epilepsy, it became a question with me whether the procedure might not prove of value as a somniferous agent in maniacal excitement, where, as is well known, there is often a considerable degree of cerebral hyperæmia. Accordingly I

compressed the carotids of a patient who was suffering from a protracted and most violent attack of mania. He had slept but little for weeks, although taking large doses of hyoscyamus and chloral. This patient was violent and destructive, tearing and breaking everything within his reach. To adjust apparatus to this man's neck, I was obliged to have him restrained by a number of attendants; his mental and motor excitement were something frightful to contemplate. His face was much distorted and flushed, and both conjunctivæ much injected. I applied compression to his arteries while he remained in a sitting posture. After the lapse of a few moments, his cries and struggles ceased, his eyelids drooped, and he began to oscillate to and fro upon his chair. In this condition he suffered himself to be led to his bed. There he remained quietly upon his back, evincing all the symptoms of drowsiness. In a shorter time than it takes to relate it, he was wrapt in slumber. This repose had all the characteristics of physiological sleep. Respiration was deep and perfectly regular. There was not the slightest cardiac irregularity or disturb-

ance whatever. Patient continued to sleep for several hours, and when at last he awoke, appeared much refreshed. I have since employed compression many times with the object of placing the brain in a condition favorable to sleep, and with an eye to limiting the amount of ganglionic activity.

I can only say that I am astounded that a method which, for theoretic reasons, must commend itself to every thoughtful understanding, should, for so long a time, have eluded the progressive inquest of the profession.

EFFECTS OF PROGRESSIVELY INCREASED COMPRESSION OF THE CAROTIDS.

The phenomena observable on augmenting more or less rapidly pressure upon the carotids are substantially as follows:

(*a*). Facial pallor.

(*b*). Drooping of the eyelid.

(*c*). Decrease in rapidity of respiration.

(*d*). Dizziness and frequently well-marked soporific tendency.

(*e*). In very anæmic persons frequently syncope; and if compression be very severe, so

that the lumina of the arteries are almost entirely closed, general convulsions may be induced.

I do not attempt to offer on this occasion any explanation for the well-known, but apparently paradoxical physiological fact, that the two opposite conditions of excessive cerebral anæmia and excessive cerebral engorgement frequently result in irritative phenomena, which may culminate in clonic and tonic convulsions. The fact is certainly most significant and well calculated to arouse an interesting train of reflections.

The symptoms above referred to are usually preceded by transitional appearances of congestion, which, however, usually disappear rapidly as soon as the *vis à tergo* has been effectually re-established. The phenomena produced by compression also exhibit considerable variation in their appearance, and it is not always possible to demonstrate them all in the same individual. In the course, however, of a large number of experiments, I have had occasion to observe most of these effects many times. What measure of inconstancy actually does exist, particu-

larly in the latter symptoms of the above group of phenomena, is adequately accounted for, I believe, by the well-known variability in the anastomotic connections between the vertebral and carotid systems at the Circle of Willis.

CEREBRAL ACTIVITY DEPENDENT ON THE BLOOD-SUPPLY.

Dr. Weir Mitchell, in his admirable monograph on "Wear and Tear," proceeds, after discussing the effects of over-taxation of the nervous centres, as follows: "When in active use, the thinking organs become full of blood, and, as Dr. Lombard has shown, rise in temperature, while the feet and hands become cold." "Nature meant that, for their work, they should be, in the first place, supplied with food, next that they should have certain intervals of rest to rid themselves of the excess of blood accumulated during their periods of activity; and this is to be done by sleep, and also by bringing into play the physical machinery of the body, such as the muscles—that is to say, by exercise which flushes the parts engaged in it, and so depletes

the brain." What far-reaching truths are contained in these few sentences, so pregnant with physiological significance! Employ what argumentative sophistry we may, it is none the less evident that the amount of cerebral activity is in direct ratio to the magnitude of the blood-supply.

CURTAILMENT OF CEREBRAL ENERGY BY LIMITING THE BLOOD-SUPPLY TO THE GANGLIA.

If, then, it be admitted that the ganglia are directly or ultimately dependent for their functional activity on the good offices of the blood-stream, it becomes perfectly evident that *limitation of blood-supply means curtailment of ganglionic function.* When it is *furthermore* considered that those reparative processes, within the ganglia themselves, are best performed while the organ is in a state of comparative anæmia, I can not repress the conviction that in carotid compression we possess the true physiological throttle valve of psychical and motor energy. Upon the great physiological principle then, that the extensity and intensity of gan-

glionic activity are ultimately dependent upon the magnitude of the blood-supply, I believe should be founded every rational system of Brain Rest. As a matter of course, the avowal of this conviction does not exclude the employment of sedatives, more particularly where there is a state of irritation within the ganglion cells themselves. I have myself employed carotid compression, in conjunction with *very* moderate doses of the bromides as well as of hyosciamus and chloral; and I have seen small doses of these drugs, which by themselves would have remained ineffective, produce most excellent sedative effects when employed in conjunction with carotid compression. And herein lies, it would seem, the future of compression of the carotids. It is *not*, I believe, a procedure which is destined to displace the existing employment of certain powerful drugs. The beneficial results to be anticipated from its employment are, on the contrary, the possibility of curtailing the use of certain powerful remedies, such as the bromides, hyosciamus, chloral, etc., etc. As an anti-phlogistic in the inflammatory invasions, which attack the meninges and the adjacent

membranes, I believe that arterial compression has a future. In cerebral hemorrhage it might prove useful. Whether it would prove useful in arresting the growth of tumors is of comparatively minor importance. In concluding this paper I can not refrain from a reference to Dr. William A. Hammond's remarkable case, which so graphically and conclusively proves that the brain is in a comparative state of anæmia during sleep. The case in question is published in Dr. Hammond's classical work on "Sleep and its Derangements," page thirty-seven. "In 1854 a man came under my observation who had, through a frightful railroad accident, lost about eighteen square inches of his skull. There was thus a fissure of his cranium three inches wide, and six inches long. The lost portion consisted of a great part of the left parietal, and a part of the frontal, occipital, and right parietal bones. The man, who was employed as a wood chopper, was subject to severe and frequent epileptic fits, during which I often attended him. In the course of my treatment I soon became acquainted with the fact that, at the beginning of

the comatose condition which succeeded the fits, there was invariably an elevation of that portion of the scalp covering the deficiency in the cranium. As the stupor passed away, and sleep, from which he could easily be aroused, ensued, the scalp gradually became depressed. When the man was awake, the region of the scalp in question was nearly on a level with the upper surface of the cranial bones. I also noticed, on several occasions, that during natural sleep the fissure was deeper, and that in the instant of awaking, the scalp covering it rose to a much higher level."

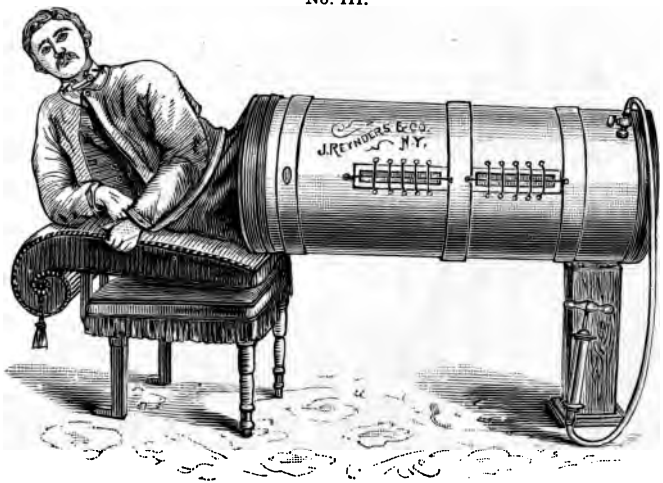
"After my attention was thus drawn to this subject, I observed that in young infants the portion of scalp covering the anterior fontanelle was always depressed during sleep, and elevated during wakefulness."

Dr. Hammond also refers to the published paper of Dr. Flemming, late professor of medicine, Queen's College, Cork, in which that able observer states that he has frequently succeeded in producing sleep by compression on the carotids.

For a further elucidation of this and allied subjects, a perusal of Dr. Hammond's interesting and instructive experiments respecting the nature of sleep, contained in the monograph above referred to, will be found most useful.

APPENDIX.

No. III.



TREATMENT WITH CAROTID COMPRESSION AND JUNOT'S APPARATUS.

APPENDIX.

SINCE the preceding paper went to press I have undertaken a series of experiments with Carotid Compression in conjunction with:

(1). An apparatus, constructed on Junot's principle, which envelopes the lower half of the body.

(2). With hot bath to the lower extremities.

(3). With ice-bags to head and spine.

CAROTID COMPRESSION IN CONJUNCTION WITH JUNOT'S APPARATUS.

(*Vid.* Plate No. 3).

Treatment on this plan may be conducted while the subject assumes a horizontal or erect position. The effects obtainable in a vertical position are of course greater than are possible in a horizontal posture, as the results of gravity are added to those of compression, and the derivative influences of a greater or less degree of vacuum. The advantage of combining treatment by derivation with carotid compression consists in the fact that under these circumstances it is not necessary, and, indeed, is not advisable, to create as great a vacuum as would be required were the derivative apparatus employed alone and unaided by arterial compression. I have usually em-

ployed this method with the subject reclining in some position *between* the horizontal and vertical, the inferior half of the body always remaining below the level of the head. In order, furthermore, to readily place a patient in any desired attitude, I have designed a species of couch provided with a ratchet and pinion attachment. By turning a crank the plane of this couch can be varied from the horizontal to any desired degree of inclination.

When employing this method of treatment, care should be taken not to cause too much redness or distension of the lower extremities. The condition of the radial pulse should also be carefully watched, and in very anæmic persons it is not advisable to reduce the fulness of the latter to a considerable degree, as syncope might be induced by such a procedure. The degree of vacuum may be measured by an appropriately constructed manometer.

CAROTID COMPRESSION IN CONJUNCTION WITH HOT BATH TO LOWER EXTREMITIES.

This is a very effective method of treatment in cases of insomnia and congestive headache. It is well to have the receptacle sufficiently deep to admit of plunging the lower extremities into the bath for some distance above the knees. When the limbs become thoroughly reddened compression may sometimes be dispensed with and the patient allowed to fall quietly asleep. A chair with a depressable back is a valuable adjunct in this treatment. Patients will frequently sleep in a chair when all efforts in this

direction prove ineffectual in bed. If the patient be placed in bed after this treatment it is well to thoroughly warm the lower portion of the bed. Wrapping the reddened extremities in flannel is likewise an excellent plan. The head should always be supported on cushions in such wise that, without causing inconvenience, it is retained in a more elevated position than the rest of the body. All sensory excitation should be excluded. The apartment should be carefully darkened. All extraneous or discordant noises are to be carefully excluded. The ticking of a metronome, however, or the monotonous roar of the ocean waves are sometimes valuable adjuncts in this treatment.

CAROTID COMPRESSION WITH ICE-BAGS TO HEAD AND SPINE.

I have essayed this method of treatment on one or two occasions and believe the combination to be a good one. My experience, however, with this system of treatment is still too limited to warrant the expression of a definite opinion as to the merits or demerits of the procedure. Although I have no experience bearing on the matter, I should not be astonished, for theoretical reasons, to find carotid compression prove more or less efficacious in acute inflammations of tissues lying above the seat of compression and largely dependent upon the carotid for their blood supply.

Also, in the arrest of epistaxis and traumatic hemorrhage temporary compression might prove of advantage. A trial of compression in the first stage of

cerebral hemorrhage might develop interesting results. Statistics as to the value of compression in the inflammatory troubles of the cerebral membranes would be of value. The propriety of employing compression in those functional troubles, so ably described by Dr. Beard, in his work on "Neurasthenia," is self-evident. Derangement of cerebral circulation is one of the most common phenomena in these disorders, and Dr. Beard has called attention to the evidence of this morbid condition of the vaso-motor centres, where he describes the extraordinary facial flushings often present in these cases. Passive congestions of the nerve-centres, especially transient hyperæmias of the brain, are among the most frequent results of Neurasthenia, according to Dr. Beard. When the intimate relationship which congestive phenomena sustain to epilepsy, hysteria, and other neuroses, is borne in mind, and when we consider the profound circulatory derangements which are so prominent a feature in these grave diseases, the necessity of treating all *early* morbid circulatory derangements, before they result in profound organic changes, is evident.

As a means of treating derangements in the vascular districts lying *below* the seat of compression the method is most valuable, as I have frequently found in the peripheral derangements of epilepsy and dementia. Very recently I have made trial of carotid compression in conjunction with inhalations of nitrous oxide gas, chloroform, and ether.

In concluding these remarks I can not refrain from *citing an interesting* case of congestive headache from

the practice of my friend, Dr. M. Josiah Roberts, of New York, which he had the courtesy to communicate to me in the following letter:

"4 W. 28TH ST., *April* 1, 1882.

"MY DEAR DOCTOR:—I have obtained such a brilliant result in the use of your instrument for temporary compression of the carotids that I feel it my duty to detail it to you, without further delay. You may perhaps remember that some days since you inadvertently left one of your earlier instruments for temporary compression in my office, and it was this which I made use of. My patient had been suffering severely from an intense throbbing headache for more than seven hours. Her face was flushed, conjunctivæ injected, and tears stood in her eyes; in fact I have never seen a patient suffering more severely from congestive headache. At once the use of your instrument suggested itself to my mind. With it I made firm pressure over both carotid arteries for forty-five seconds, when the patient declared her headache had entirely disappeared, and I removed the instrument, and have not since reapplied it.

"One week has now elapsed, and the patient told me to-day that she has had no recurrence of the trouble.

"Faithfully yours,

"M. JOSIAH ROBERTS."

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